

REMARKS

In response to the Office Action mailed August 28, 2003, Applicant amends Claims 1 and 12 to better define the present invention. Claims 5, 10-11 and 13-15 are cancelled. New Claims 16-20 are added to claim the invention fully disclosed in the application. Support for this addition can be found, for example, in the text of the Specification from page 18, line 32 to page 19, line 29, and FIGS. 12-13.

Claim Rejections under 35 U.S.C. 112:

Claims 1-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite. In particular, the Examiner indicates that the term "connecting" in Claims 1 and 10 is unclear and "the chamber" in Claims 1 and 10 lacks antecedent basis.

Applicant amends Claim 1 to change "connecting" to "connected to" and "the chamber" to "a chamber". Claim 10 is canceled. Therefore, reconsideration of the rejection under 35 U.S.C. 112, second paragraph is respectfully requested.

Claim Rejections under 35 U.S.C. 102:

Claims 1, 2, 4-6, 9-13 and 15 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,068,549 ("Jackson"). Claims 1, 2, 4, 6, and 9 are further rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,024,630 ("Shendon"). Applicant respectfully traverses the rejections.

As the Examiner knows, a claim is anticipated under 35 U.S.C. 102 only if each and every element as set forth in the claim is found, either expressly or inherently described in a single prior art reference. Applicant respectfully submits that neither Jackson nor Shendon teaches each and every element of Claims 1, 2, 4, 6, 9 and 12 of the present invention.

As amended, Claim 1 recites a compartmentalized flexible member coupled to a wafer carrier base and defining a plurality of concentric chambers. The pressures within the plurality of concentric chambers are independently controllable.

Jackson teaches a polishing head assembly for polishing wafers. The polishing head of Jackson includes a sub-carrier and two diaphragms that define three chambers for applying a first pressure to the sub-carrier, a second pressure to a retaining ring, and a third pressure to a region

between the sub-carrier and the retaining ring, respectively. However, Jackson does not teach a *compartmentalized flexible member coupled to a wafer carrier base and defining a plurality of concentric chambers*, as recited in Claim 1 of the present invention. The flexible member of the present invention defines a plurality of concentric chambers and provides independently controllable pressures that make possible local region or zone polishing of wafers.

Nor does Shendon teach the *compartmentalized flexible member coupled to a wafer carrier base and defining a plurality of concentric chambers*, as recited in Claim 1 of the present invention. Shendon teaches a polishing head assembly that utilizes a wafer backing member having a wafer facing pocket. The wafer facing pocket is sealed against the wafer and is pressurized with air to provide a *uniform force distribution across the wafer*. However, Shendon does not teach a plurality of concentric chambers within which the pressures are independently controllable.

Reconsideration of the rejections under 35 U.S.C. 102 is therefore respectfully requested.

Claim Rejections under 35 U.S.C. 103:

Claims 3, 7, 8 and 14 are rejected under 35 U.S.C. 103 as being unpatentable over Jackson. Applicant respectfully traverses.

As the Examiner is aware, to establish a prima facie case, three basic criteria must be met: (1) the prior art must provide one of ordinary skill with a suggestion or motivation to modify or combine the teachings of the references relied upon by the Examiner to arrive at the claimed invention; (2) the prior art must provide one of ordinary skill with a reasonable expectation of success; and (3) the prior art, either alone or in combination, must teach or suggest each and every limitation of the rejected claims. The teaching or suggestion to make the claimed invention, as well as the reasonable expectation of success, must come from the prior art, not Applicant's disclosure. If any one of these criteria is not met, prima facie obviousness is not established.

As stated above, Jackson does not teach or reasonably suggest the *compartmentalized flexible member* as recited in Claim 1 of the present invention, which defines a plurality of concentric chambers and provides a plurality of independently controllable pressures through the plurality of concentric chambers to the wafer against a polishing pad. That the wafer carrier

assembly of the present invention can provide independently controllable pressures within a plurality of chambers in the compartmentalized flexible member is significantly advantageous over the prior art wafer polishing heads. As illustrated in FIG. 7 of the present invention, varying pressures within the chambers urge corresponding portions of the flexible member against the wafer at corresponding localized regions or zones on the wafer surface. This allows control and varying the amount of material removal at each of the localized zones on the wafer surface. The pressure applied to the wafer is separately controlled by the pressure in each of the chambers as indicated by arrows P1-P4 in Fig. 7. Accordingly, the localized zones or regions on the wafer surface can be polished at different rates by controlling the pressure in the corresponding chambers.

Claims 2 and 3 of the present invention further recite limitations on retaining ring bearing that is operably connected to the retaining ring for urging the retaining ring against a polishing pad. The Examiner takes the Official notice in the Office Action that the use of flexible and hydrostatic bearings is old and well known in the art of workholding, and argues that one of ordinary skill would consider the use of a hydrostatic bearing to be a matter of design choice. Applicant respectfully disagrees and traverses the taking of official Notice. The very inclusion of a ring bearing, hydrostatic or not, is neither suggested nor taught in Jackson. The apparatus taught by Jackson employs direct, frictional contact between a retaining ring and a subcarrier. In addition, Jackson neither discloses a bearing in the vertical direction nor provides any motivation to modify the Jackson apparatus to incorporate such a bearing. The use of a bearing in the present invention is not the same design as Jackson including a different type of bearing but rather an entirely new and improved design.

Claim 7 of the invention recites that the flexible member includes flanges that are secured to a lower surface of the wafer carrier base. These flanges provide wall or bias pressures on the flexible member in addition to the different chamber pressures. Jackson does not teach or suggest this feature as recited in Claim 7.

Claim 8 of the invention further recites an embodiment of the wafer carrier assembly including four annular concentric chambers. This is not an obvious matter of design choice as commented by the Examiner. Generally, the outermost annular chambers are more narrow in the radial direction in comparison to the first and second chambers in order to provide accurate

pressure control of narrow edge regions adjacent the edge of the wafer independently of the pressures applied to the center and middle portions of the wafer. While the present invention is not limited to the four chamber design, Claim 8 recites specific size and shape of the chambers to provide an preferred embodiment of the invention.


Reconsideration of the rejections under 35 U.S.C. 103(a) is therefore respectfully requested.

Applicant adds new Claims 16-20 into the application, to recite the invention shown in FIGS. 12-13 and described in the text of the Specification from page 18 to 19. Neither Jackson nor Shendon teach or suggest the invention recited in new Claims 16-20

Applicant respectfully submits that this application is in conditions for allowance. If any matter can be solved by telephone, the Examiner is invited to call the undersigned attorney at the phone number listed below.

The Commissioner is authorized to charge any additional required fees, or credit any overpayment, to Dorsey & Whitney LLP Deposit Account No. 50-2319 (Order No. A-69175-1/MSS/ (463035-650)).

Respectfully submitted,



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